

REMARKS

In accordance to the foregoing, claims 1-3, 5-8, 10-13, 15-18, 20 and 21 have been amended. Claims 4, 9, 14 and 19 have been cancelled. Claims 1-3, 5-8, 10-13, 15-18, 20 and 21 are under consideration and pending. Independent claim 1 has been amended to recite 50% or more of a triphenolic compound (A). Antecedent support for this can be found at page 19, line 26, through page 20, line 4 of the specification. In view of this change, claims 5 and 15 have been amended to recite less than 50 wt. % of other compounds. Further, claims 4 and 14 have been cancelled. The claims have also been to recite that the aryl group has 6 to 14 carbon atoms. See claims 1, 5 and 15, for example. This is to correct a clerical error. Antecedent support is found in paragraphs [0024], [0026], [0035] and [0038], which describe "a phenyl group" of C6 moiety.

GENERAL COMMENTS

It is stated throughout the Office Action that claim language reciting "or less" includes zero, "or more" includes 100%, and ". . . obtained by . . . " in a material claim (developer) is a product-by-process. Regarding the language "or less" and "or more," Applicants would like to remind the Examiner that these phrases should be read in the context of the claim when determining the upper and lower bounds of the claimed features. In particular, if the quoted language is found in a dependent claim, the Examiner should keep in mind the features of the claim(s) from which it depends.

For example, in claims 3 and 13, the ratio of the triphenolic compound (B) content to the triphenolic compound (A) content may be not less than 0.5 and not more than 1, because this parameter is a ratio based on the triphenolic compound (A) content. Moreover, it is noted that a ratio is being claimed and not a percentage. Therefore the Office Action's interpretation that the phrase "'or more' includes 100%" would not make sense for this particular feature being claimed.

In now cancelled claims 4 and 14, the triphenolic compound (A) content was 20 wt% or more. These claims are cancelled in view of a change to claim 1, discussed below. However, the triphenolic compound (A) content may be 100 wt%, because the triphenolic compound (A) includes the triphenolic compound (B) and optionally the compound (C). That is, the triphenolic compound (A) is a generic expression, and the triphenolic compound (B) is a specific expression within the triphenolic compound (A).

With respect to the language "... obtained by ...", the principle feature of the invention relates to the "use" of a particular species of triphenolic compound (A), i.e. triphenolic compound (B), as a developer for forming a color composition by contacting the developer with a leuco dye. Therefore, claim 1 has been amended to recite a method for forming a color composition by contacting the leuco dye with a developer.

INFORMATION DISCLOSURE STATEMENT OF JANUARY 11, 2005

In the Office Action at item X on pages 20-23, the Examiner requests an English language translation of the relevant portions of five references: (1) JP8230328; (2) JP2001096926; (3) JP9278695; (4) JP6115255; and (5) WO 02/098674.

Although it is believed there has already been full compliance with the IDS rules, attached hereto are partial translations of the relevant portions of each of the references. Additionally, with respect to reference WO 02/098674, the Examiner is also directed to corresponding U.S. Patent No. 7,141,359 which should resolve any problems for that reference.

Applicants appreciate the Examiner's kind reminder to have all references considered.

CLAIM REJECTION UNDER 35 U.S.C. §112, SECOND PARAGRAPH

In the Office Action at item II on page 2, claim 7 was rejected under 35 U.S.C. §112, second paragraph, for lack of antecedent basis for the term "R_f." Claim 7 has been amended to depend from claim 5 to provide proper antecedent basis, and it is believed that the rejection is overcome.

CLAIM REJECTIONS UNDER 35 U.S.C. §102

A. THE GB 1493760 REFERENCE

In the Office Action at item IV on pages 4-7, claims 1-6, and 13-17 are rejected under 35 U.S.C § 102(b) as being anticipated by GB 1493760 ("GB '760"), or in the alternative, as being obvious over the same under 35 U.S.C. § 103(a). The reasons for the rejection are set forth in the Office Action mailed January 16, 2009 and therefore not repeated. The rejections are traversed and reconsideration is requested.

GB '760 discloses triphenolic compounds represented by the formula (I) on page 1, left column, lines 11-18. Perhaps the Examiner believes these are similar to the triphenolic compound (A) according to the claimed invention. In the triphenolic compound of the formula (I) if an OH group is present for at least one of the 4- and 4' - positions of the phenol moieties on the right and left sides, the Examiner apparently believes formula (I) corresponds to the triphenolic compound (B) according to the claimed invention, which is a species of the triphenolic compound (A). Further, GB '760 discloses compounds which fall within the triphenolic compound (A) but not within the triphenolic compound (B). GB '760 does not differentiate between the species of the triphenolic compound (A).

GB '760 describes that the compounds are useful for antioxidants, polymerization inhibitors, and stabilizers and also for starting materials for production of epoxy resins, Novolak phenolic resins and resol phenolic resins. GB '760 does not specify the action and effect or the usefulness of those triphenolic compounds.

GB '760 does not describe or suggest that the compounds disclosed therein can be used as a developer for forming color for a leuco dye that may be a colorless or light-colored dye precursor.

When a phenolic developer mainly composed of the specific triphenolic compound of the claimed invention is used for forming color for a leuco dye, high sensitivity, excellent image storage properties, and less occurrence of fog in non-image areas can be obtained. These properties have not been achieved by the conventional polyphenol developers. GB '760 is quite silent about forming a color composition from the developer and leuco dyes as claimed.

B. THE POCHWALSKI REFERENCE

In the Office Action at item V on pages 7-9, claims 1-6, and 13-17 are rejected under 35 U.S.C § 102(b) as being anticipated by Pochwalski et al in Chemical Abstract XP-002399188 ("Pochwalski"), or in the alternative, as being obvious over the same under 35 U.S.C. § 103(a). The reasons for the rejection are set forth in the Office Action mailed January 16, 2009 and therefore not repeated. The rejections are traversed and reconsideration is requested.

Pochwalski discloses the production of 2,6-bis(4-hydroxybenzy1)-p-cresol from 2,6-dimethylolp-cresol and phenol. The Examiner apparently believes this product corresponds to the triphenolic compound (B), which is a species of the triphenolic compound (A).

However, Pochwalski mentions only a method of producing the compound and its melting point as a novel crystalline compound. The reference does not describe or suggest that the compound can be used as a developer for forming a color composition for a leuco dye that may be colorless or light-colored. Pochwalski is quite-silent about the advantageous effect associated with using a compound as a developer for leuco dyes, as described above regarding the claimed invention.

C. THE SHIRAKAWA REFERENCE

In the Office Action at item VI on pages 9-12, claims 1-6, and 13-17 are rejected under 35 U.S.C § 102(b) as being anticipated by Shirakawa et al (U.S. Patent No. 5,629,128), or in the alternative, as being obvious over the same under 35 U.S.C. § 103(a). The reasons for the rejection are set forth in the Office Action mailed January 16, 2009 and therefore not repeated. The rejections are traversed and reconsideration is requested.

Shirakawa relates to a positive-type photoresist composition containing an alkali-soluble resin and a particular 1,2-quinoneazide compound. This photoresist is applied to a substrate, is exposed and then forms a circuit pattern on the substrate. This photoresist may be used for the production of semiconductors such as Integrated Circuits, liquid crystals, and circuit substrates such as thermal heads.

Shirakawa discloses a 1,2-naphthoquinonediazid-5- (and/or -4-) sulfonate ester of the alkali-soluble resin and the polyhydroxy compound of the formula(I) as a positive-type photoresist. This photosensitive ester can be obtained by an esterification reaction of a polyhydroxy compound of the formula(I) and 1,2- naphthoquinonediazid-5-(and/or -4-) sulfonyl chloride.

Shirakawa discloses triphenolic compounds D, E, F, G, H, I and J in Synthesis Examples 3-6. Of these compounds, compounds D, F and H fall within the triphenol compound (A) according to the claimed invention; and compounds E, G, I and J do not fall within the triphenol compound (A) because the phenol moieties on the right and left sides have a hydroxymethyl substituent. Of compounds D, F and H, the first and second ones correspond to the triphenolic compound (B) according to the claimed invention, and the third does not correspond to the triphenolic compound (B) because none of 4- and 4'-positions of the phenol moieties on the right and left sides has an OH group. Thus, Shirakawa discloses compounds which fall within the triphenolic compound (B), and also those which fall within the triphenolic compound (A) but not within the triphenolic compound (B). Shirakawa does not recognize the difference between different triphenolic compounds (A). According to Shirakawa, the triphenolic

compounds D, E, F, G, H, I and J are used as starting materials or intermediates for the synthesis of polyhydroxy compounds of the formula (I), such as compounds I-7, I-9, I-11 and I-12.

However, Shirakawa does not describe or suggest that these triphenolic compounds can be used as a developer for forming a color composition for a leuco dye that may be colorless or light-colored. Shirakawa is quite silent about the advantageous effect associated with using the compounds as a developer for leuco dyes as described above regarding the claimed invention.

D. THE SATO REFERENCE

In the Office Action at item VII on pages 12-14, claims 1-6, and 13-17 are rejected under 35 U.S.C. § 102(b) as being anticipated by Sato et al (U.S. Patent No. 5,523,396), or in the alternative, as being obvious over the same under 35 U.S.C. § 103(a). The reasons for the rejection are set forth in the Office Action mailed January 16, 2009 and therefore not repeated. The rejections are traversed and reconsideration is requested.

Sato relates to a method for synthesis of quinonediazide esters for use in the production of semiconductors such as IC, circuit boards for LCD devices, thermal heads and in other photofabrication processes, and also to a positive-type photoresist composition containing the quinonediazide ester produced by the same method. The photosensitive compound is obtained by an esterification reaction of a polyhydroxy compound and 1,2-naphthoquinonediazid-5-(and/or -4-) sulfonylchloride. Sato discloses triphenolic compounds VI, VII, VIII, X, XI, XIII, XIV and XXIII. Of these, the Examiner apparently believes compounds VI, VII, VIII (in part), X, XI, XIII, XIV and XXIII fall within the triphenol compound (A) according to the claimed invention. Perhaps the Examiner believes compounds VI, VII, VIII (in part), X, XI, XIII, XIV and XXIII correspond to the triphenolic compound (B) according to the claimed invention. Another part of compound VIII does not fall within the triphenol compound (A). Thus, even if Sato discloses compounds which fall within the triphenolic compound (B) which is a species of the triphenolic compound (A), Sato also compounds which do not fall within the triphenolic compound (A). Sato makes no distinction between the different triphenolic compounds (A). According to Sato, the triphenolic compounds VI, VII, VIII, X, XI, XIII, XIV and XXIII are used as starting materials or intermediates for synthesis of polyhydroxy compounds which are starting materials for quinonediazide esters, photosensitive compounds.

However, Sato does not describe or suggest that these triphenolic compounds can be used as a developer for forming a color composition from a leuco dye that may be a colorless or

light-colored dye precursor. Sato is quite silent about the advantageous effect as a developer for leuco dyes, as described above regarding the claimed invention.

E. THE OYA REFERENCE

In the Office Action at item VIII on pages 15-17, claims 1-6, 10, 13-17 and 20 are rejected under 35 U.S.C § 102(b) as being anticipated by Oya et al (U.S. Publication No. 2002/0048732), or in the alternative, as being obvious over the same under 35 U.S.C. § 103(a). The reasons for the rejection are set forth in the Office Action mailed January 16, 2009 and therefore not repeated. The rejections are traversed and reconsideration is requested.

Oya relates to a photo thermographic material, which is obtained by forming a photosensitive layer comprising (a) a photosensitive silver halide, (b) a reducible silver salt, and (c) a reducing compound on a support with (d) a binder. Through exposure and oxidation-reduction reactions due to heating the material, a latent image is formed and then thermally developed to produce the final image. Oya intends to obtain a photosensitive material that has a high sensitivity, a high development speed and consistent performance even if the heat development temperature varies. Oya thus provides a reducing compound (c) represented by the formula (1). Oya further mentions compounds (I-1) to (I-34) including (I-31) and (I-32), as specific examples of the compound of the formula (2). These photosensitive materials are used for black-and-white photosensitive materials and for color photosensitive materials, and can be used with various kinds of ultrahigh contrast agents or contrast accelerators. The grains of silver halide can be improved with various metal complexes and used together with sensitizer dyes or supersensitizers. Oya further describes that this photo thermographic material can have an image-forming layer on one side of a support and a back layer on the other side thereof.

Thus, Oya describes using a reducing compound (c) of the formula (1) as a photo thermographic material and also using compounds of the formula (2) or (3) as a reducing agent (e) for the silver salt. Oya mentions many kinds of polyphenol compounds as specific examples of the compounds of the formula (2). Of these, perhaps the Examiner believes compounds (I-31) and (I-32) are similar to the claimed triphenolic compound (A). However, compounds (I-31) and (I-32) are different from the claimed triphenolic compound (B) because none of 4- an 4'-positions of the right and left phenol moieties has an OH group. Accordingly, compounds (I-31) and (I-32) do not fall within the triphenolic compound (B), which is a species of the triphenolic compound (A)

Further, Oya does not disclose or suggest using triphenolic compounds as a developer for forming a color composition from a leuco dye, which may be a colorless or light-colored. Oya

is quite silent about the advantageous effects associated with using the claimed developer with leuco dyes, as described above regarding the claimed invention.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

In the Office Action at item IX on pages 17-20, claims 1-6, and 8-21 are rejected under 35 U.S.C § 103(a) as being obvious over Oya et al (U.S. Publication No. 2002/0048732) in view of Maskasky et al (U.S. Publication No. 2004/0053173). The reasons for the rejection are set forth in the Office Action mailed January 16, 2009 and therefore not repeated. The rejection is traversed and reconsideration is requested.

Maskasky is used as a secondary reference in combination with Oya and is thus discussed below referring to Oya. Maskasky relates to a photo thermographic material, which is obtained by forming a photosensitive layer comprising (a) grains of a photosensitive silver halide, (b) reducible silver ions, and (c) reducing agent for the reducible silver ions, on a support with (d) a binder. Through exposure and oxidation-reduction reactions, a latent image is formed and then thermally developed to form a final image. Maskasky also describes using a reducing agent (c) may be a composition containing hindered phenols. For color photo thermographic imaging materials, one or more reducing agents can be oxidized directly or indirectly to form or release dyes. The dye-forming or releasing compound may be any colored, colorless, or lightly colored compound that can be oxidized to a color by heating. Leuco dyes are mentioned as one of the dye-forming compounds.

The Office Action states that Oya does not specify the use of colorless or light-color dye (color) precursor, but it was known in the art at the time of the invention to use a colorless or light-colored dye (color) precursor to obtain a developed color image. The Examiner argues that it would have been obvious to one of ordinary skill in the art to cite the known colorant for a reasonable expectation of obtaining a developed color image. The Examiner refers to paragraphs [0160] and [0161] of Maskasky.

The Examiner apparently believe the triphenolic compounds (I-31) and (I-32) of Oya are similar to the triphenolic compound (A) according to the claimed invention. However, as described above, the triphenolic compounds (I-31) and (I-32) do not fall within the claimed triphenolic compounds (B) neither of the 4- and 4'-positions on the right and left phenol moieties has an OH group.

Further, Maskasky does not describe or suggest that these triphenolic compounds can be used as a developer for forming color from a colorless or light-colored leuco dye precursor.

Maskasky is quite silent about the advantageous effect as a developer for leuco dyes as described above regarding the present invention.

As described above regarding the six cited references, when the specifically claimed triphenolic compounds are used with a leuco dye to form a color composition, the advantage of high sensitivity, excellent image storage properties, and also less occurrence of fog in non-image areas can be obtained. These advantages have not been achieved by with conventional polyphenol developers. All of the six cited references are quite silent about the advantageous effects associated with using the developer with leuco dyes. None of the references, alone or in combination, disclose or suggest using the claimed developer for forming color composition with a colorless or light-colored leuco dye precursor. None mention the advantageous effects achieved when using the developer with leuco dyes.

Thus, Applicants submit that the claims patentably distinguish over the applied references and are in condition for allowance.

CONCLUSION

If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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(1) Translation of the relevant portions

[Claim 1]

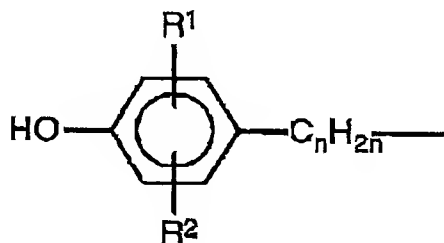
1. A thermoresponsive microcapsule including therein a diazonium salt or an electron-supplying dye precursor, characterized in that:
the capsule wall of said microcapsule consists of a polymer obtained by polymerization of:

a compound having two or more active hydrogen atoms in the molecule with an isocyanate compound composed of an addition product of a polyhydroxyl compound composed of a polyphenol compound having three or more hydroxyl groups in the molecule, represented by the general formula (1) or (2):

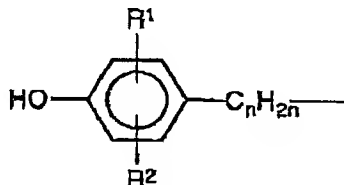


[where R1 and R2 each independently represent a hydrogen atom, a methyl group, a methoxymethyl group or a cycloalkyl group with 3 to 6 carbon atoms,

R3 represents a hydrogen atom, a methyl group or

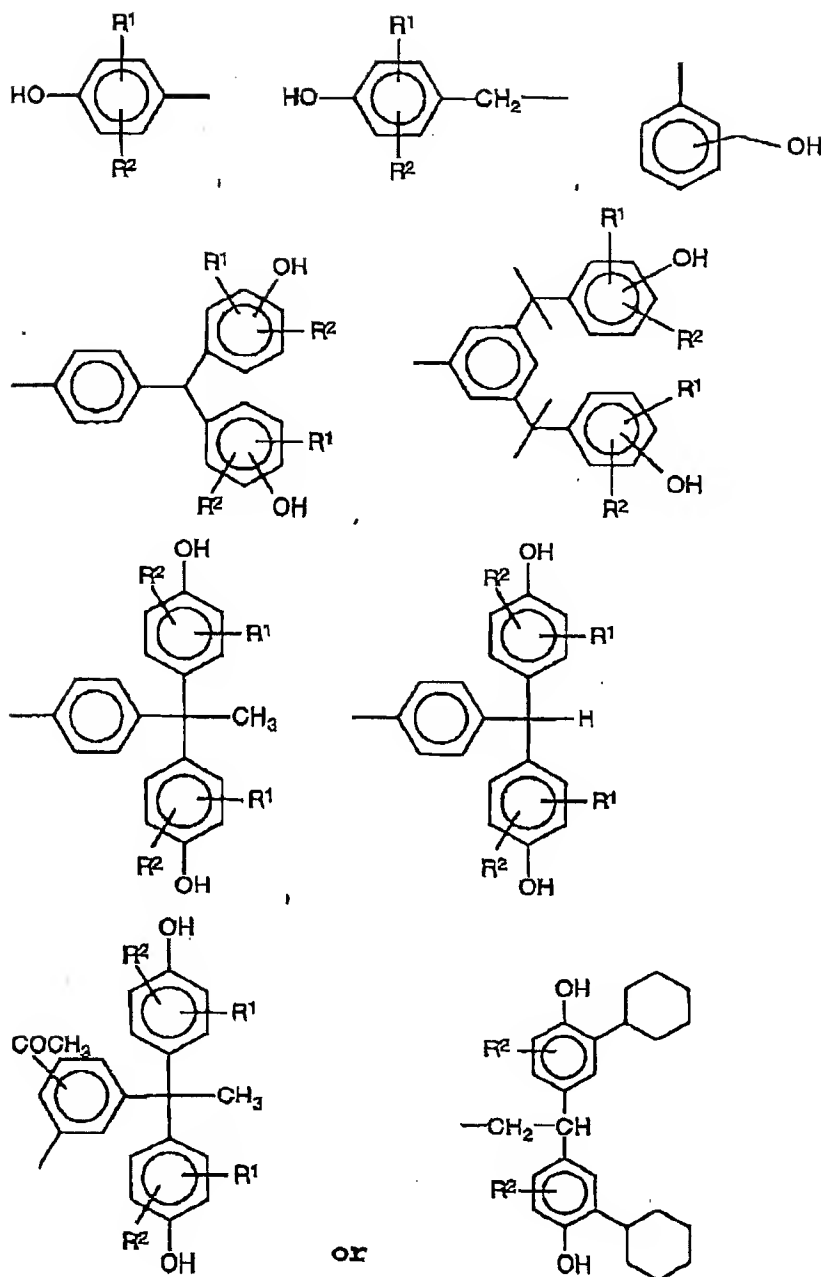


(where R1 and R2 are the same as above and n is 1 or 2),
R4 represents a methyl group or

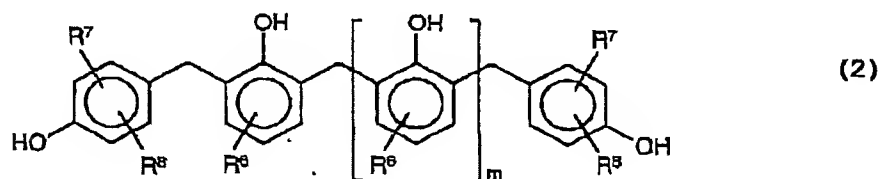


(where R1 and R2 are the same as above and n is 0, 1 or 2),
R5 represents

JP '328



(where R^1 and R^2 are the same as above),
provided that when R^5 represents a group having one hydroxyl group, any
or both of R^3 and R^4 represent a group having a hydroxyl group]



(2)

JP '328

[where R6 is a hydrogen atom, a methyl group, a phenyl group or a cyclohexyl group, R7 and R8 each independently represent a hydrogen atom, a methyl group, a methoxymethyl group or a cycloalkyl group with 3 to 6 carbon atoms, and m is 0 or 1]
and a bifunctional isocyanate having two isocyanate groups in the molecule.

[paragraph 0001]

[Technical Field Pertinent to the Invention]

The present invention relates to a thermoresponsive microcapsule useful for thermosensitive recording material, and a thermosensitive recording material and a multicolor thermosensitive recording material using this microcapsule.

[paragraph 0011]

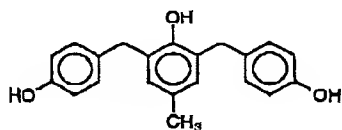
[Problem to be Solved by the Invention]

The present inventors intended to realize color development satisfying highly controllable thermographic property of microcapsule required for multi-color thermosensitive recording materials, thereby further improving the shell life while maintaining the high color development. The present inventors have eagerly investigated the type and addition method materials for forming the core of microcapsule such as electron-supplying dye precursors or diazonium salts, materials for forming the wall of microcapsule, surfactants and the like, particularly investigated the type and addition method of materials for forming the wall of microcapsule. Thus, they reached the present invention. The present invention is intended to provide a coupler that is suitably used for thermosensitive and multi-color thermosensitive recording materials, or a thermoresponsive microcapsule that is excellent in showing high color development in contact with a developer and in storage property (long shell life). The present invention is intended to provide multi-color thermosensitive recording materials that have high sensitivity and are excellent in color reproducibility and storage property.

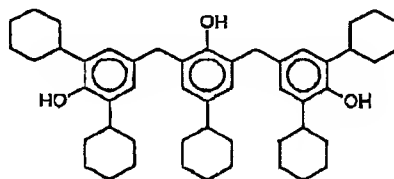
[paragraph 0023]

Specific examples of the polyphenol compounds represented by the general formula (1) or (2) of the present invention are:

P-6



P-11



(I/O=0.395)

(1) Translation of the relevant portions

[paragraph 0001] (page 2, lines 10-16)

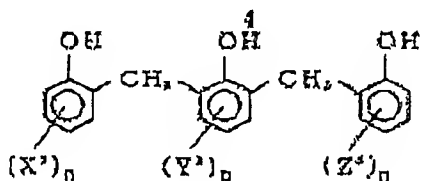
[Utilization Field in Industry]

The present invention relates to a thermosensitive recording material which is widely used for printers such as for output of computers and calculators, medical measurement recorders, low-speed or high-speed facsimile machines, ticket vending machines, thermosensitive copy, labels of POS system, and the like, and excellent in image stability, thermal resistance, and color developing sensitivity.

[paragraph 0007] (page 3, column 3, lines 5-11)

[Means for Solving the Problem]

The present invention provides a thermosensitive recording material having on a support a thermosensitive recording layer mainly composed of a leuco dye and a developer for coloring the leuco dye by heating, characterized by using at least one of the compounds represented by the following general formulae:



where X₃, Y₃ and Z₃ are the same or different and represent an lower alkyl group, an aralkyl group or an aryl group, and n is an integer of 0-4.

[paragraph 0012] (page 3 column 4, lines 42-44)

2,6-bis[(2-hydroxy-5-methylphenyl)methyl]-4-methylphenol (as a specific example of the compounds represented by the above general formula)

(1) Translation of the relevant portions

[Claim 1]

1. A triphenolic compound composition characterized by having a melting point of 150 to 200°C and comprising two kinds or more of triphenolic compounds in mixture, which are obtained by reacting a 2,6-dimethylol-p-substituted phenol and at least one o-unsubstituted, p-substituted phenol and have a purity of 95% or more and a melting point of more than 200°C.

[paragraph 0001]

[Technical Field Pertinent to the Invention]

The present invention relates to a triphenolic compound composition and a developer for thermosensitive recording materials using the same. More specifically, the present invention relates to a triphenolic compound composition having a melting point in a range of 150 to 200°C and comprising two kinds or more of triphenolic compounds in mixture having controlled purity and melting point, which is useful for a developer for thermosensitive recording materials. The present invention relates to a developer for thermosensitive recording materials using the same and excellent in color development.

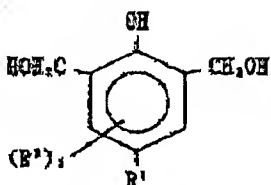
[paragraph 0007]

[Mode for Carrying Out the Invention]

As the starting materials for synthesis of triphenolic compounds for use in the triphenolic compound composition of the present invention, (A) a 2,6-dimethylol-p-substituted phenol and (B) at least one o-unsubstituted, p-substituted phenol.

[paragraphs 0008-0009 & 0014-0015]

As the 2,6-dimethylol-p-substituted phenol, component (A), the compounds represented by the general formula (I) are mentioned:



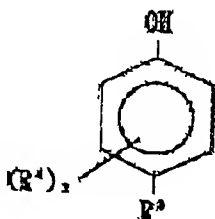
... (I)

where R1 is a halogen atom, a cyano group or an alkyl or alkoxy group

JP '926

having 1 to 4 carbon atoms, R2 is a hydrogen atom, a halogen atom, a cyano group or an alkyl or alkoxy group having 1 to 4 carbon atoms, two R2 can be identical to or different from each other.

As the at least one o-unsubstituted, p-substituted phenol, component (B), the compounds represented by the general formula (II) are mentioned:

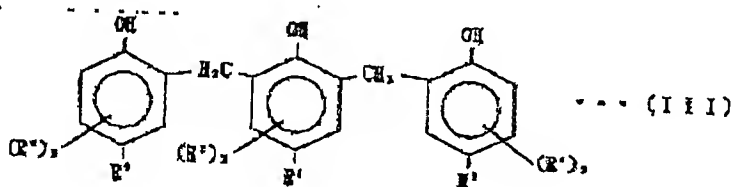


... (II)

where R3 is a halogen atom, a cyano group or an alkyl or alkoxy group having 1 to 4 carbon atoms, R4 is a hydrogen atom, a halogen atom, a cyano group or an alkyl or alkoxy group having 1 to 4 carbon atoms, three R4 can be identical to or different from one another.

[paragraphs 0018-0019]

The triphenolic compound obtained by reacting the above components (A) and (B) component is a compound having the structure represented by the general formula (III):



... (III)

where R1 to R4 are the same as above.

(1) Translation of the relevant portions

[paragraph 0001]

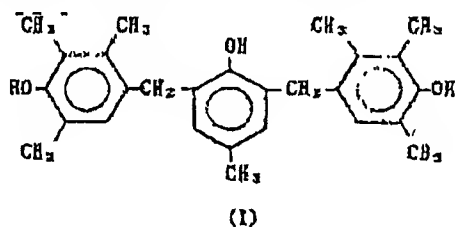
[Technical Field Pertinent to the Invention]

The present invention relates to a novel trisphenol compound, 2,6-bis[(4-hydroxy-2,3,5-trimethylphenyl)methyl]-4-methylphenol. This trisphenol compound is useful for starting materials for synthesis of epoxy resins for use in sealing materials for large scaled circuits, laminated materials, electrically insulating materials and the like, curing agents for epoxy resins, base materials for photosensitive materials, developers or discoloration preventers for use in thermosensitive recording materials. It is also useful for antibacterial agents, antifungal agents and the like.

[paragraphs 0014-0016]

[Means for Solving the Problem]

The novel trisphenol compound of the present invention is 2,6-bis[(4-hydroxy-2,3,5-trimethylphenyl)methyl]-4-methylphenol represented by the formula (I):



WO02/098674

This reference corresponds to US 2005118526 (A1), which is available to the Examiner.

WO02/098674 relates to a developer for a thermosensitive recording material, comprising a composition composed of condensates represented by the formula (I), wherein said composition includes: (i) a condensate of the formula (I) having two cores wherein $n=0$ (2-,2'-bisphenol derivative) as the main component, and (ii) a condensate of the formula (I) wherein n is an integer of 1-3. WO02/098674 also relates to a thermosensitive recording material comprising said developer and an alkaline dye (leuco dye). As seen from the above, WO02/098674 relates to a bisphenolic compound as the main component which essentially has OH groups at the 2- and 2'-positions of the right and left benzene rings, while the present invention relates to the triphenolic compound which essentially has OH group at least one of the 4- and 4'-positions of the right and left benzene rings. WO02/098674 does not describe or suggest that the composition mainly composed of the triphenolic compound according to the present invention has a remarkably advantageous effect as a developer for leuco dyes.